# downy mildew

*Peronospora destructor* (Berk.) Caspary

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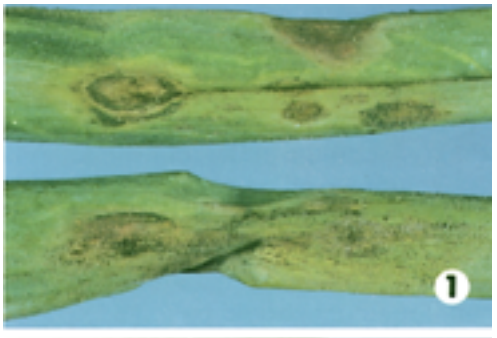


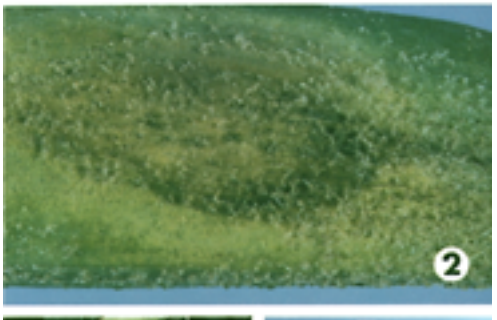


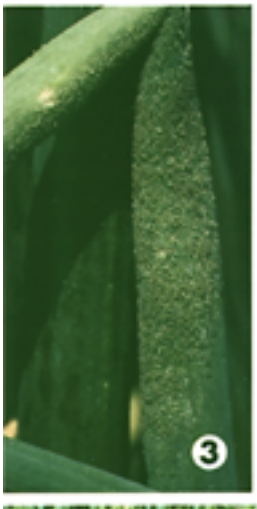




## INTRODUCTION

Downy mildew (DM) attacksonions in many partsoftheworld. It can become severe on leaves of commercially grown onion plants and on leaves and seed stalks of onions grown for seed, especially when relatively cool, moist weather prevails. Other reported hosts are shallot, leek, garlic, and chive. In muckland onion growing areas in the Northeast, DM generally is not detected until mid-to late July. DM rarely, if ever, occurs in growing areas with a warmer climate presumably because of relatively warmer night temperatures during May and June.

## DESCRIPTION

Downy mildew is characterized by pale-green, yellowish to brownish areas of irregular size and shape (oval tocylindrical) on infected leaves or seed stalks (Fig. 1). These areas may consist of alternating yellow and green layers of tissue. The causal organism of DM produces fruiting bodies and spores called sporangia on the surface of the leaves and seed stalks (Fig. 2). The masses of spores are at first transparent to greyish, and then rapidly becomeviolet incolor(Fig.3). Leaves become girdled in the region where mildew develops and the leaves collapse (Fig.4). This results in dead leaf tips that usuallycan be seen within defined regions in a field (Fig. 5). The dead leaf tissue is rapidly colonized by purple blotch, which is dark in color **and** obscures DM. DM seldom kills onion plants, but bulb growth may be reduced. Bulb tissue, especially the neck, may become spongy and the bulb may lack keeping quality.

## DISEASE CYCLE

### Dormant Period

It is believed that the DM fungus overwinters primarily as mycelium in infected onions that remain in onion fields or in nearby cull piles. The pathogen also can overwinter in perennial varieties of Onion in home gardens. It is suspected that spores of the fungus that persist in the soil may directly infect the roots of young onion plants. These plants become systemically infected and serve as focal points for infection in commercial onion fields.

### Primary Spread

When favorable environmental conditions occur, the overwintering fungal mycelium in systemically infected plants produces spores. After dissemination through the air, these spores infect the leaves of onion plants in commercial fields. Spores are formed at night when high humidity and temperatures of 4-25 C (39-77 F) occur, with an optimal temperature of 13 C (55 F). The spores mature early in the morning and are disseminated during the day. Spores remain viable for about 4 days. Germination occurs in free water from 1-28C (34-82 F) with an optimal range of 7-16 C (45-61 F). Rain is not needed for infection if heavy dews occur continuously during the night and morning hours.

### Secondary Spread

The mycelium of DM in leaves of infected onion plants in commercial bulb production fields produces a new crop of spores called conidia in cycles of approximately 11-15 days. As the upper portions of a leaf are killed, the fungus infects the next lower part of the leaf in each successive cycle of spore formation. Such cycles can be repeated several times until the leaf may be completely killed. These repeated cycles of spore formation can result in severe and continued epidemics of DM if disease favorable environmental conditions persist.

## CONTROL

The dithiocarbamate fungicides such as maneb and mancozeb applied to control Botrytis leaf blight also provide protection against DM. Another Botrytis leaf blight fungicide, chlorothalonil (Bravo), *does not* control DM. When either maneb or mancozeb are tank mixed with chlorothalonil, both DM and BLB can be controlled economically. In recent years, growers using this combination spray have successfully controlled both diseases simultaneously.

To reduce primary inoculum of DM, cull piles should be removed and volunteer onions rogued. Perennial onions should not be grown in back yard gardens in the vicinity of commercial onion fields. Other sanitation programs that would reduce or eliminate the source of primary inoculum should be used.

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